REMARKS

Applicant has carefully considered the Office Action of June 27, 2006 rejecting a portion of the claims. Applicant wishes to express his appreciation to the Examiner for the early indication of allowable subject matter. The present response is intended to fully address all points of objection raised by the Examiner, and is believed to place the application in condition for allowance. Favorable reconsideration and allowance of the application are respectfully requested.

Claims 1, 20 and 22 have been amended to improve clarity. Claims 23-25, and 27 have been cancelled. Therefore, claims 1-22, 26 and 28-36 remain in the case.

The present invention discloses a reduced keyboard system for text input on an electronic device. The device includes a virtual keyboard, and an input device for inputting a word onto the keyboard using a sliding motion. To input a word, the user places the input device on the first letter of the desired word, slides the input device to the next letter, and continues to subsequent letters until the final letter is reached, after which point the input device is lifted. Thus, for each word, a bi-dimensional pattern, representing movement of the input device from one letter to the next, is formed on the virtual keyboard.

In the present invention, word identification is not performed via identification of each individual letter of the inputted word, as is well-known in the art. Rather, the system performs whole-word recognition, based solely on the bi-dimensional input pattern of the inputted word. Words are recognized using a multi-step process in which the bi-dimensional input pattern is analyzed (using a line

simplification algorithm and filters including first and last letters, intermediate letters, curvilinear length) and in which the bi-dimensional input pattern is compared (based on its monotonous segments and closest matching distance) to a temporary library of candidate patterns (segmented also into monotonous segments) generated from a list of words to which the inputted word could correspond based on features of the inputted pattern (for example, first and last letters, intermediate letters).

The Examiner has rejected claim 36 under Sec. 102(e) as being anticipated by U.S. Patent No. 6,810,271 to Wood et al. It is believed that the Wood reference is of a completely different nature and function than that of the present invention, for the reason described below.

Wood describes a unique keyboard design that is especially applicable for cell phones. The keyboard has a plurality of individual numeral keys assigned to individual numerals that are disposed in a circular manner about a navigation key for navigating about the display or a selected central key. While primarily invented for use with numerals, there is brief mention of the possibility of use for alphabetical symbols. Column 3, lines 3-17, states: "Alternatively, in writing short message service (SMS) messages, letter "a" is selected by a single key-press of this key, letter "b" is selected by a double key-press of this key, letter "c" is selected by a triple key-press of this key and so on."

Thus, Wood employs the use of individual distinct keystrokes in order to determine the identity of individual letters being inputted. For example, to input the letter "b", a specific key is pressed twice in quick succession. The system recognizes the desired inputted symbol as a "b", since

the corresponding key was pressed twice. In such a manner, a succession of letters forming words can be inputted to form an SMS message.

In contrast to Wood, the present invention does not identify a string of individual letters in order to form the inputted word. Rather, the system of the present invention recognizes inputted words via the unique bi-dimensional input pattern formed when the user slides the input device from the first letter of the word, to the intermediate letters, and finally to the last letter, without lifting the input device from the keyboard. Whole-word recognition is then performed by a unique system that processes and analyses the bi-dimensional input pattern formed on the virtual keyboard.

Thus, unlike Wood, the system of the present invention is not based on the recognition of individual letters or symbols. It is therefore maintained that the Wood patent and the present invention relate to word-processing systems of a very different nature. Whereas Wood is geared towards the recognition of individual numerals and letters, the present invention is designed for whole-word recognition.

As stated in the decision in In Re Marshall, 198 USPQ 344 (1978), "To constitute an anticipation, all material elements recited in a claim must be found in one unit of prior art." Since the Wood reference neither 1) identically describes the invention, nor 2) enables one skilled in the art to practice it, Applicant deems the 102(e) rejection improper, and respectfully requests that it be withdrawn.

The Examiner has rejected claims 1, 5-6, 13-15, 20, and 22-24 under Sec. 103(a) as being unpatentable over U.S. Patent No. 5,574,482 to Niemeier in view of U.S. Patent No. 6,298,146 to Ilan et al.

Niemeier relates to a method of text input onto a virtual, touch-sensitive screen. Letters are made temporarily available to the user based on studies of frequency of occurrence and sequence in the language being used. The temporarily available letters may be selected for input by a sliding motion of an input device. The user slides an input device from the initially selected letter into the area representing any of the temporarily available keys, inputting any of the letters represented thereon. The process of selecting by touch and slide may be repeated as desired by the user.

The main goal of the Niemeier patent is to reduce the tapping necessary on the part of the user. By providing temporary letters, based on the identity of the previous letter which was inputted, the user has the option of sliding the input device from a first letter to a second (temporary) one, because of the close proximity of the two letters. This removes the need (at least for that particular letter combination) to pick up the input device and tap the screen again at a different location.

It is appreciated that Niemeier does not use the formation of a bi-dimensional input pattern for the word identification. In fact, the pattern resulting from sliding of the input device from a first letter to a second, temporarily-available letter is not registered or recorded at all by the system. The sliding motion simply serves the function of adding to the convenience and ease-of-use of the device on the part of the user, since the input device does not have to be lifted from the screen in order to reach the next letter. The user need not utilize the temporary-available keys if he does not wish to do so.

It is also appreciated that in Niemeier, words are identified through the identification of individual letters. This is in contrast to the present invention, in which whole-words are identified only following the complete inputting of the word. In Neimeier, individual letters are identified as they are inputted, in order to enable providing of temporarily-available keys, and of course, to identify the inputted word.

In Column 5, lines 2-6, of the Niemeier patent, it is stated: "More than one temporary key can be selected by keeping the input device on the screen and continuing the wipe to the next desired active key area." There is no indication, however, of any bi-dimensional input pattern that is produced or of any significance to such an input pattern in word identification. Letters are simply inputted one after the next (albeit through a sliding or "wiping" motion) and identified one after the next in order to form a complete word.

In contrast, in the present invention, word identification is not performed through identifying each letter as it is activated.

Furthermore, in the Niemeier reference, sliding from one letter to the next is merely an option, since the user may or may not choose to select one of the temporary available keys which are provided. If he wishes, he may tap the input device at another discrete location on the keyboard in order to input the next letter of the word. Thus, the sliding motion is not required in the Neimeier patent.

In the present invention, however, it is precisely the unique bi-dimensional input pattern formed through the sliding motion of the input device on the keyboard as a word is inputted that enables correct identification of the inputted word. Individual letters of the inputted word are not

determined as they are inputted on the keyboard, as is the case in Neimeier.

Ilan relates to an instruction input unit for supplying operating instructions to a machine, for example, a microwave oven, a washing machine, or a telephone. The unit includes a touchpad, an instruction library and a recognizer. The touchpad receives an input pattern from a user and the instruction library stores a multiplicity of operating instruction patterns. Each instruction pattern has an operating instruction associated therewith. The recognizer detects which of the multiplicity of instructions patterns the input pattern most closely matches, and provides the machine with the operating instruction associated with the matched operating instruction pattern (see Column 1, lines 43-60).

As a specific example, refer to Column 4, lines 5-20, which states: "... touchpad **50** provides the input pattern for recognizer **56** which attempts to match the input pattern to one of the instruction patterns stored in the instruction library." It is noted that in Ilan, the library contains a collection of permanent, pre-stored instructions that are specific to the device onto which the input unit is being used. Only a limited number of instructions are stored. Each instruction has an instruction pattern associated thereto which the user enters on the touchpad in order for the machine to carry out the desired task.

For example, in the case of a microwave oven, if the user forms the letter "C" on the touchpad, then the recognizer will attempt to match the input pattern "C" to the operating instruction pattern "C" stored in the library, and will then command the oven to cook (see Column 4, lines 16-26), since this is the operating instruction that corresponds to the operating instruction pattern "C".

In other cases, "the instruction patterns can also be alphanumeric characters, each of which can be separately recognized. Thus, the user can input the following letters: "C", "O", "O" and "K" and recognizer **56** will recognize the letters individually, producing the string "cook". Recognizer **56** will then provide the string "cook" to the machine operating unit **50** of microwave oven **40** as the instruction." (see Column 4, lines 27-34 and Fig. 2).

It is appreciated that in contrast to the present invention, recognizer 56 is not capable of recognizing an input pattern for a complete word, as is the system of the present invention. Rather, as stated above, in cases where individual letters are entered onto the touch pad, the recognizer attempts to recognize each letter individually, and only then is a full string of letters produced in order to form a word. In the present invention, however, whole-word recognition is performed only after a complete word has been inputted through a sliding motion.

The Ilan patent and the present invention each relate to data input of a very different nature. Ilan relates only to the input of single commands or instructions. The machine has a stored library of instruction patterns whose associated instructions are activated only when the recognizer matches the inputted pattern with the instruction pattern. There is no mention of segmenting the bi-dimensional input pattern or the library into monotonous segments or applying geometrical filters to the bi-dimensional input patterns. All that is stated is that the recognizer "attempts to match" the input pattern to an operating instruction pattern in the library (see Column 1, lines 16-26). If no match is made, then no instruction is carried out.

Ilan is thus completely different from the present invention. In the present invention, there is a temporary library of bi-dimensional patterns generated corresponding to words to which the inputted pattern could correspond, based at least on determination of possible first and last letters, and intermediate letters of the inputted word. Thus, when a pattern is inputted on the device, the system determines certain characteristics of the inputted pattern, and then generates a list of candidate words to which the inputted word could correspond based on said characteristics. Then, a bi-dimensional pattern is generated for each of the candidate words, thereby producing a temporary pattern library.

The patterns in this temporary library are then compared mathematically to the bi-dimensional input pattern, and the best solution(s) is provided. Following recognition of the inputted word, the temporary library is deleted. It would be highly impractical to store a permanent list of patterns associated which each and every word of the dictionary, and thus a temporary list, which is erased and created anew for each and every pattern entered onto the device, is used.

Contrast the above to Ilan, in which a permanent list of instruction patterns are stored in the unit for comparison to the inputted pattern. Ilan contains patterns for only a limited number of instructions and is thus capable of identifying only a limited number of patterns.

In the present invention, however, the number of input patterns that are recognizable is huge, corresponding to the number of words in the dictionary that is used! As mentioned previously, the recognizer in Ilan serves only to "attempt to match" the inputted pattern to a stored pattern, and no indication whatsoever is indicated in the patent as to how this is done. The recognition system of the present invention

is much more complex and includes the creation of a temporary list of candidate patterns, and this and other steps are not found in the Ilan patent.

In light of the above arguments, it is maintained that both Neimeier and Ilan disclose systems which are completely different in nature from the present invention and therefore it would be not be obvious to one skilled in the art to combine the teachings of both in order to produce the present invention.

As to claims 13-14, and 22-23, it is again stated that there is no mention in Ilan (or any other patent mentioned by the Examiner) of segmenting the bi-dimensional input pattern into monotonous segments and applying a line-simplification algorithm. As to claims 15, 24, there is further no mention in Ilan of computing the matching distance between the bi-dimensional input pattern and patterns generated from a plurality of words to the dictionary database class to which the inputted word belongs.

Neither Niemeier nor Ilan disclose whole-word recognition, and in fact, each teach away from whole-word recognition by disclosing recognition of individual letters, symbols, or instructions, as explained above.

Claims 1 and 20 have been amended in order to place further emphasis on the key differences between the present invention and the prior art, and in order to improve clarity.

The Examiner has rejected claims 2-3, 28-29 under 103(a) as being unpatentable over Ilan et al. and Niemeier as applied to claims 1,20, and further in view of U.S. Pat. No 5,156,475 to Zilberman.

Zilberman relates to a keyboard comprising a plurality of regular keys, and an inverted T-shaped key subdividing the regular keys into two sections including one section for left-

hand operation and another section for right-hand operation.

It is maintained that since the combination of Ilan and Niemeier do not constitute a sufficient basis for a 103(a) rejection, then by further including the keyboard described by Zilberman, it would nonetheless still be non-obvious to one skilled in the art to produce the system of the present invention.

The Examiner has rejected claims 4, 30 under 103(a) as being unpatentable over Ilan et al. and Niemeier as applied to claims 2, 28, and further in view of U.S. Patent No. 3,945,382 to Einbinder.

Einbinder relates to orthogonal ten-finger keyboards that are designed for maximizing entry rates and stroking accuracy and minimizing finger motions and the time needed to master the keyboard. The keyboards contain curved key rows. The Einbinder patent does not concern whole-word recognition, as does the present invention.

It is therefore maintained that since the combination of Ilan and Niemeier do not constitute a sufficient basis for a 103(a) rejection, then by further including the keyboard described in Einbinder, it would nonetheless still be non-obvious to one skilled in the art to produce the system of the present invention.

The Examiner has rejected claims 7-8, 19, 31-32 under 103(a) as being unpatentable over Ilan et al. and Niemeier as applied to claims 2, 28, and further in view of Wood et al.

The Wood reference has been previously discussed above. Wood does not employ whole-word recognition, as does the present invention. It is thus maintained that it would not have been obvious to one of ordinary skill in the art to incorporate the teaching of Wood into Ilan and Niemeier in

order to enable the rapid insertion of keys. It is again pointed out that text entry in the Wood patent is performed in a manner that is completely different from the present invention, with the user pressing once, twice, or three times (for example) on a specific key in order to produce the letters "a", "b", and "c". There is no mention at all of a sliding motion or a bi-dimensional input pattern.

The Examiner has rejected claims 16-18,25-26 under 103(a) as being unpatentable over Ilan et al. and Niemeier as applied to claims 2, 28, and further in view of U.S. Pub. No. 2003/0165801 A1 to Levy.

It is noted that claim 25 has been deleted.

Levy discloses a method of interpreting keyboard input including identifying a first letter of a target word from activation of an initial key, identifying a set of possible intermediate letters of the target word in response to non-activating traversal of associated keys of the keypad following activation of the initial key, and identifying a last letter of the target word from activation of a final key following the non-activating traversal. The target word is then determined based upon the identified first, intermediate, and last letters.

In Levy, intermediate letters are determined by finding inflection points in the traverse, by identifying duplicate letters of the word by measuring the transient variations in finger height, and by determining letters to omit by measuring transient variations of finger height. Following this step, and the identification of the last letter of the word, the resulting potential word combinations are looked up in the dictionary.

Paragraph 22 of the Levy reference states: "The first and last letters are clearly defined by virtue of the user

pressing the first and last keys. However, in this algorithm, the intermediate letters may consist of none or all of the letters "B", "A", and "F", in that order, potentially including CBAFE, CBAE, CAFE, CBFE, CBE, CAE, CFE and CE. However, the only word in the dictionary is CAFE. The system would therefore select, and display, "cafe" as the intended word."

Thus, Levy operates by identifying the possible intermediate letter candidates using the above-mentioned criterion, and then producing a list of all possible word combinations. The system then checks which combination corresponds to an actual word (in the above example, the solution was the word "café").

It is to be emphasized that in the Levy reference, words are recognized in a manner that is totally different than the present invention. The present invention does not operate via determination of intermediate letters followed by determination of possible letter combinations and dictionary checking for valid words, as Levy does. Rather, the present invention operates via comparison of the bi-dimensional input pattern with a library of input patterns formed from real words to which the inputted word could correspond, based on certain features of the input pattern such as first and last letters and intermediate letters.

A further clear difference between Levy and the present invention is that the present invention allows for ambiguities in the path traversed by the input device or finger, and allows for the user to make errors in the exact path which is traversed. In the determination of intermediate letters, neighboring letters are taken into consideration, since (as is the case often with finger input), it is difficult to be precise when inputting a word through a fast sliding motion

(for example, in a QWERTY keyboard, the user may slide his finger over the letter "g" when he actually intended to slide it over the letter "h", or he may slide his finger over a region covering both keys "g" and "h"). The allowance of neighboring letters serves to provide a very high level of accuracy. By contrast to this, Levy does not allow for any inaccuracies in letter input, since if Levy were to take into account all the possible ambiguities, the system would produce too many word combination solutions.

It is thus maintained that since the combination of Ilan and Niemeier do not constitute a sufficient basis for a 103(a) rejection, then by further including the intermediate letters determination described by Levy, it would nonetheless still be non-obvious to one skilled in the art to produce the system of the present invention.

The Examiner has rejected claim 27 under 103(a) as being unpatentable over Ilan et al. and Niemeier as applied to claims 20, and further in view of U.S. Pub. No. 2003/00096735801 A1 to Hayashi et al.

Claim 27 has been deleted.

Hayashi relates to a network access terminal including an extraction unit for extracting first information from an image, an acquisition unit for acquiring from a predetermined storage device the first information extracted by the extraction unit and address information specified by a second information different from the first information, from among a plurality of address information stored in the predetermined storage device. The terminal further includes a communication unit for accessing an address based on the address information obtained by the acquisition unit.

The Hayashi reference relates to a field of the art which is totally different than the present invention. Specifically,

Hayashi relates to network servers which are accessed using image data which contain digital watermarks, and the extraction of the digital watermarks from the image data. Hayashi does not disclose a method for whole-word recognition, nor does it relate in any manner to word-processing. While Hayashi does disclose certain methods of general image processing (lossy compression, luminance correction, geometrical conversion, filtering) (see paragraph 0096), these methods are image-processing techniques which are well-known in the art and they have no connection with the processing of the bi-dimensional input pattern of the present invention.

In citing the references under Sec. 103(a), the question is raised whether the reference itself would suggest the invention, as stated in the decision of In Re Lintner (172 USPQ 560, 562, CCPA 1972):

"In determining the propriety of the Patent Office case for obviousness in the first instance, it is necessary to ascertain whether or not the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the references before him to make the proposed substitution, combination or other modification."

Similarly, In Re Regel (188 USPQ 136 CCPA 1975) decided that the question raised under Sec. 103 is whether the prior art taken as a whole would suggest the claimed invention to one of ordinary skill in the art. Accordingly, even if all the elements of a claim are disclosed in various prior art references, the claimed invention taken as a whole cannot be said to be obvious without some reason given in the prior art why one of ordinary skill would have been prompted to combine the teachings of the references to arrive at the claimed invention.

Simply put, and as stated In Re Clinton (188 USPQ 365 CCPA 1976), "do the references themselves ... suggest doing what appellants have done", such that there is a requirement that the prior art must have made any proposed modification or changes in the prior art obvious to do, rather than obvious to try.

It is respectfully put forward by the Applicant that there is no reason to consider the present invention as being unpatentable for obviousness over Niemeier in view of Ilan and the secondary references under Sec. 103(a). These prior art references do not suggest the use of whole-word recognition, based solely on the bi-dimensional input pattern of the inputted word.

In view of the foregoing remarks, all of the remaining claims in the application are deemed to be allowable. Further reconsideration and allowance of the application is respectfully requested at an early date.

Respectfully submitted,

Edward Langer, Pat. Atty.
Attorney for Applicant
Reg. No. 30,564

Shiboleth, Yisraeli, Roberts, Zisman & Co
350 Fifth Ave., 60th floor, New York, NY 10118
Tel: (212) 244-4111 Fax: (212) 563-7108